

- HURD, P. D., AND E. G. LINSLEY. 1964. The squash and gourd bees—genera *Peponapis* Robertson and *Xenoglossa* Smith—inhabiting America north of Mexico (Hymenoptera : Apoidea). *Hilgardia*, 35(15): 275–477.
- LINSLEY, E. G., AND J. W. MACSWAIN. 1955. The habits of *Nomada opacella* Timberlake with notes on other species (Hymenoptera : Anthophoridae). *Wasman Jour. Biol.*, 13(2): 253–276.
- MICHENER, C. D. 1953. Comparative morphological and systematic studies of bee larvae with a key to the families of hymenopterous larvae. *Univ. Kansas Sci. Bull.*, 35(8): 987–1102.

Five New Species of Phalangodidae from California (Opiliones)

THOMAS S. BRIGGS AND KEVIN HOM
Galileo High School, Lux Laboratory, San Francisco

A winter reconnaissance of various habitats in northern and central California revealed several undescribed phalangodids of unusually small size. The results of this study are further indication that these arachnids are worthy of continued research. They are predictably located and are often the major if not the sole occupant of their restrictive under-surface habitat. Several important populations are now being threatened by suburban development.

Application of the limited characters for generic classification used by Goodnight and Goodnight (1953) in their study of the Mexican Phalangodidae indicated that this collection belonged in genus *Sitalcina* Banks although some of these new species have an unusually small number of tarsal segments on the second pair of legs. All specimens of *Sitalcina* examined by the authors possessed the calcaneus and astragulus divisions of the femora and metatarsi on all legs. These divisions were described as absent from the metatarsi of the species of *Sitalcina* reported by Goodnight and Goodnight (1942).

The characters of *Sitalcina* are revised as follows to accommodate the broadened generic characters of 1953 (op. cit.):

SITALCINA Banks, 1911

- Sitalces* (part) Banks, 1893. *Trans. Amer. Ent. Soc.*, 20: 15.
Metapachylus Banks, 1909. *Proc. Acad. Nat. Sci. Philadelphia*, 61: 230.
Sitalcina Banks, 1911. *Pomona Jour. Ent.*, 3: 412–421.
Goodnight and Goodnight, 1942. *Amer. Mus. Novitates*, No. 1188, p. 8.
Paramitraceras (part) Roewer, 1912. *Arch. Naturg.*, 77A: 155.
Pachylicus (part) Roewer, 1923. *Die Webernechte der Erde*, p. 118.

First tarsus with three segments; distitarsus of first leg with two segments, of second with two or three; maxillary lobe of second coxa without a ventral projection; palpus with moderate ventral spination. Eye tubercle on anterior margin of cephalothorax, without spines, smooth or with tubercles. Dorsum with five distinct areas, boundaries parallel to one another; first area without a median line; all dorsal areas and free tergites without median spines. Abdomen uniformly rounded caudad. Metatarsi of legs divided into astragali and calcanea.

TYPE SPECIES.—*Sitalcina californicus* (Banks).

KEY TO SPECIES OF SITALCINA

1. Second tarsus with four or five segments 2
 Second tarsus with three segments *sequoia*, new species
2. Second tarsus with four segments 3
 Second tarsus with five segments 5
3. Fourth tarsus with four segments 4
 Fourth tarsus with five segments *serpentinae*, new species
4. Width of eye tubercle one-fifth maximum width of abdomen *minor*, new species
 Width of eye tubercle one-third maximum width of abdomen
 *tiburona*, new species
5. Third tarsus with five segments 6
 Third tarsus with four segments *kaweahensis*, new species
6. Eye tubercle in the form of a pointed cone, slanting anteriorly
 *californicus* (Banks)
 Eye tubercle in a different form 7
7. Eye tubercle in the form of a rounded cone, bearing dorsal teeth
 *cockerelli* Goodnight and Goodnight
 Eye tubercle in the form of a rounded cone, without teeth
 *lobatus* Goodnight and Goodnight

The following descriptions were based on holotypes and allotypes stained with eosin yellow on Canada balsam slides. Paratypes were preserved in a solution 8% in acetic acid, 5% in glycerine, 26% in water and 61% in isopropyl alcohol.

Sitalcina minor Briggs and Hom, new species

(Figs. 3 and 8, Pl. I)

FEMALE.—Total body length, 1.14 mm. Cephalothorax, 0.33 mm. Width of body at widest portion, 0.77 mm. Width of eye tubercle, 0.14 mm. Length of eye tubercle, 0.08 mm.

	I	II	III	IV	Palpus
Trochanter	0.11 mm	0.11 mm	0.17 mm	0.17 mm	0.13 mm
Femur	0.39	0.48	0.36	0.54	0.30
Patella	0.19	0.20	0.17	0.20	0.19
Tibia	0.28	0.44	0.34	0.44	0.20
Metatarsus	0.25	0.34	0.39	0.56	
Tarsus	0.27	0.59	0.27	0.34	0.19
Total	1.49 mm	2.16 mm	1.70 mm	2.25 mm	1.01 mm

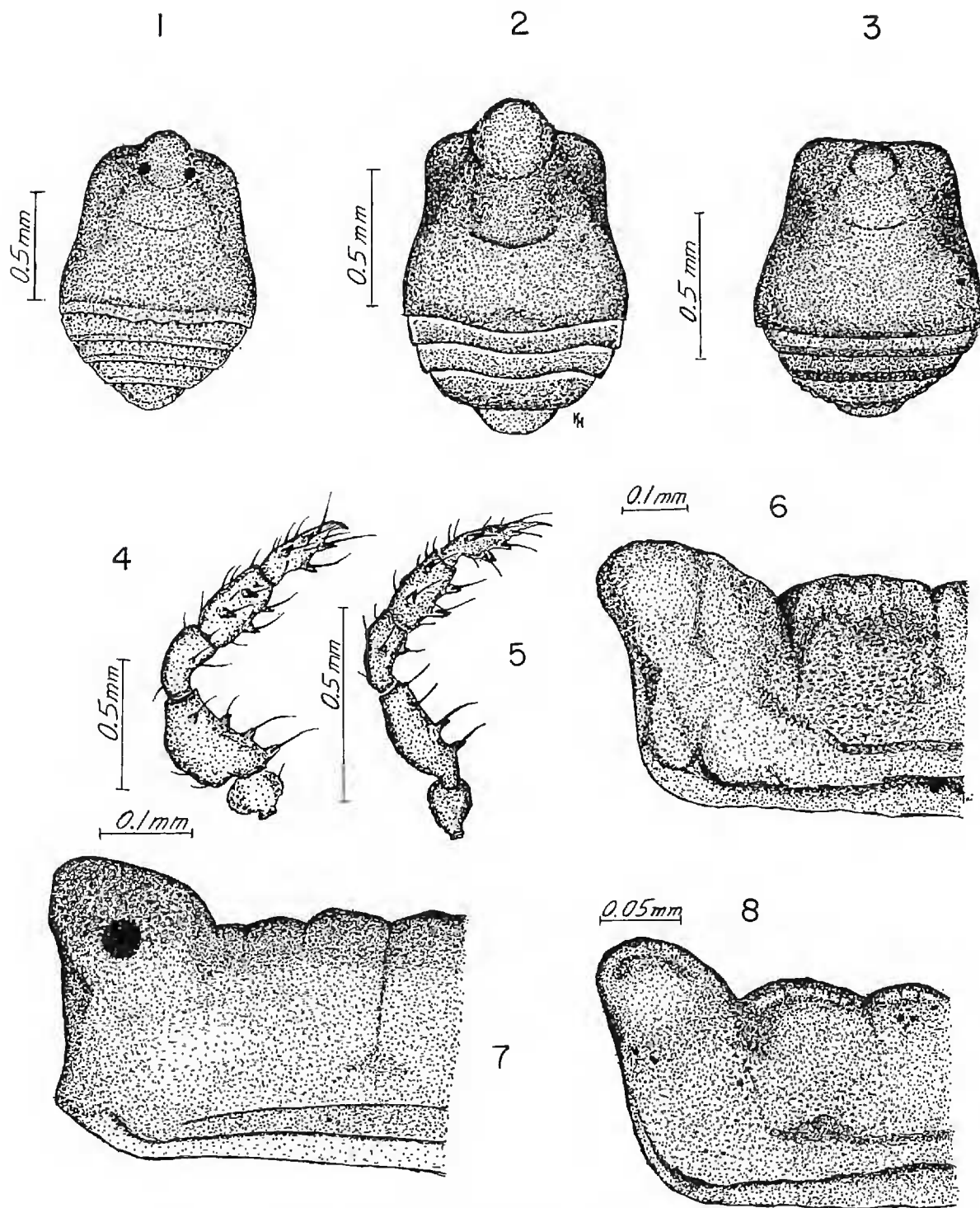


Plate I. Fig. 1, *Sitalcina kaweahensis*, dorsum; Fig. 2, *S. tiburona*, dorsum; Fig. 3, *S. minor*, dorsum; Fig. 4, *S. tiburona*, ventral view of left palpus; Fig. 5, *S. kaweahensis*, ventral view of left palpus; Fig. 6, *S. tiburona*, lateral view of cephalothorax; Fig. 7, *S. kaweahensis*, lateral view of cephalothorax; Fig. 8, *S. minor*, lateral view of cephalothorax.

Dorsum finely granulate, without tubercles. Eye tubercle elliptical, broader than long; profile descends rapidly posteriorly. Eyes and corneal lenses absent. Five parallel dorsal areas apparent in lateral view. Anterior margin of fourth coxa and posterior margin of second coxa with prominent tubercles.

Fine granulations on legs terminate abruptly at calcaneus of metatarsus. Tarsal segments: 3-4-4-4. Distitarsus of 2nd pair of legs with 3 segments.

Palpus armed as in Fig. 4, Plate I.

Body concolorous yellow-orange with venter and tarsi somewhat lighter than dorsum.

MALE almost identical in appearance to female.

Holotype female, allotype male and ten paratypes.—SPRING 0.75 MILE NORTH OF CRYSTAL SPRINGS DAM ON COUNTY ROAD No. 14, SAN MATEO COUNTY, CALIFORNIA, 23 January 1966, K. Hom and T. Briggs. Topotypes collected 19 February 1966. One paratype one mile NW Morgan Hill, Santa Clara County, California, 26 February 1966, K. Hom. Numerous paratypes from marshy slope on west side of Silver Creek Road, 5 miles SE of Tully Road, San Jose, Santa Clara County, California, 27 February 1966, T. Briggs and C. Fox. Several paratypes from marshy slope ½ mile NW Santa Teresa Park, Santa Clara County, California, 27 February 1966. Holotype and allotype deposited in the collection of the California Academy of Sciences. Ten paratypes deposited in the collection of the American Museum of Natural History.

Sitalcina tiburona Briggs and Hom, new species

(Figs. 2 and 6, Pl. I)

FEMALE.—Total body length, 1.17 mm. Cephalothorax, 0.49 mm. Width of body at widest portion, 0.82 mm. Width of eye tubercle, 0.28 mm. Length of eye tubercle, 0.25 mm.

	I	II	III	IV	Palpus
Trochanter	0.16 mm	0.13 mm	0.16 mm	0.16 mm	0.20 mm
Femur	0.54	0.60	0.46	0.60	0.40
Patella	0.22	0.24	0.17	0.24	0.22
Tibia	0.34	0.50	0.34	0.50	0.27
Metatarsus	0.34	0.43	0.43	0.62	
Tarsus	0.39	0.65	0.34	0.38	0.27
Total	1.99 mm	2.55 mm	1.90 mm	2.50 mm	1.36 mm

Dorsum finely granulate, without tubercles. Eye tubercle oval, bluntly pointed anteriorly, about same length as width; profile descends gently posteriorly. Eyes and corneal lenses absent. Five dorsal areas apparent in lateral view.

Fine granulations on legs terminate abruptly at calcaneus of metatarsus. Tarsal segments: 3-4-4-4. Distitarsus of 2nd pair of legs with 3 segments.

Palpus armed as in Fig. 4, Plate I.

Body concolorous yellow-orange with venter and tarsi somewhat lighter than dorsum.

MALE almost identical in external appearance to female.

Holotype female, allotype male and ten paratypes.—SPRINGS ABOUT ½ MILE DUE NORTHEAST OF BEL AIRE SCHOOL, TIBURON, MARIN COUNTY, CALIFORNIA, 15 January 1966, T. Briggs and K. Hom. Topotypes col-

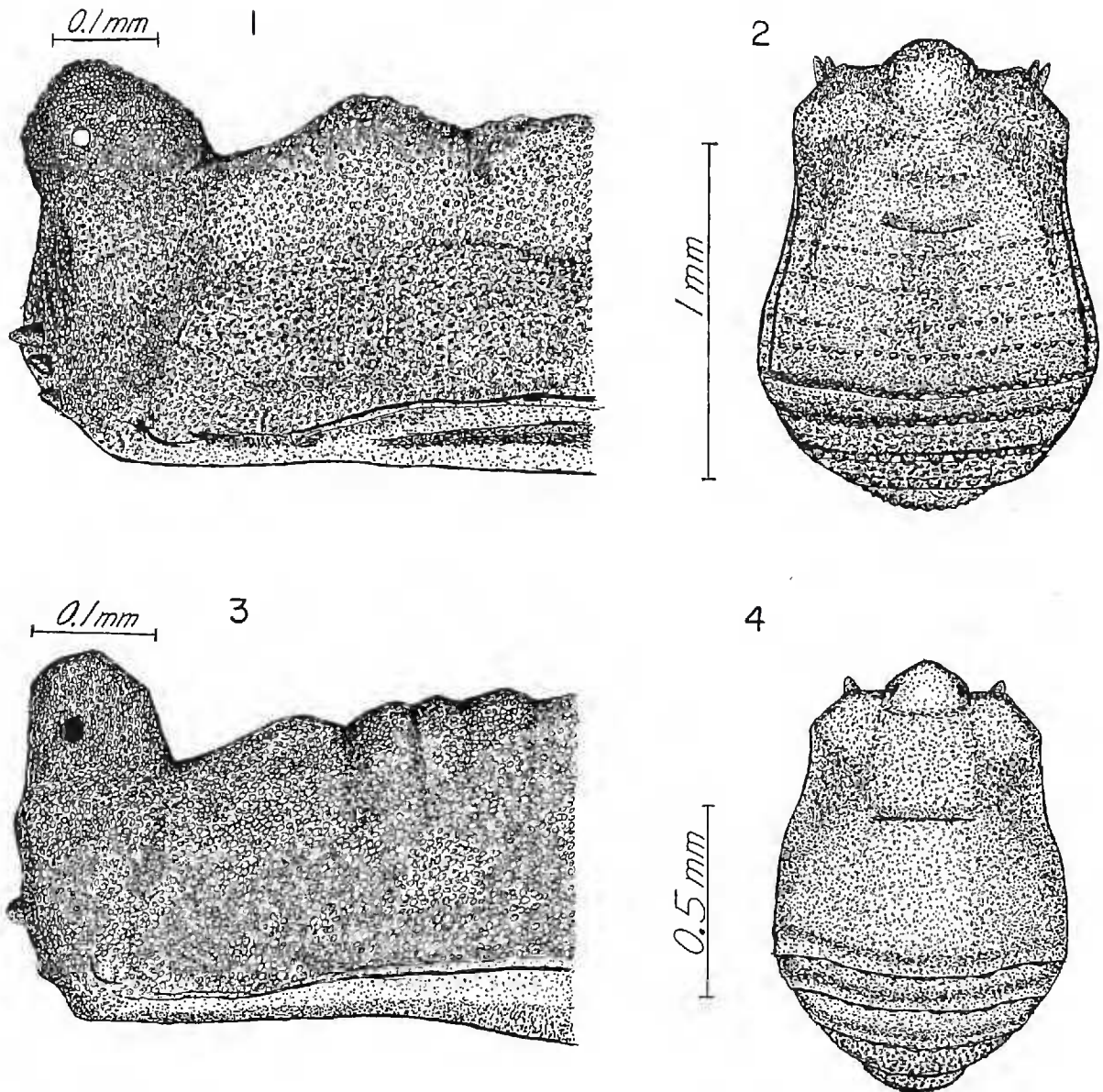


Plate II. Fig. 1, *Sitalcina serpentinea*, lateral view of cephalothorax; Fig. 2, *S. serpentinea*, dorsum; Fig. 3, *S. sequoia*, lateral view of cephalothorax; Fig. 4, *S. sequoia*, dorsum.

lected 22 January 1966, T. Briggs, K. Hom and A. Jung. Additional paratypes from $\frac{1}{2}$ mile due south of El Campo, Tiburon Peninsula, Marin County, California, 22 January 1966, K. Hom. Holotype and allotype deposited in the collection of the California Academy of Sciences. Ten paratypes deposited in the collection of the American Museum of Natural History.

***Sitalcina kaweahensis* Briggs and Hom, new species**

(Figs. 1, 5 and 7, Pl. I)

Total body length, 1.47 mm. Cephalothorax, 0.39 mm. Width of body at widest portion, 0.92 mm. Width of eye tubercle, 0.20 mm. Length of eye tubercle, 0.17 mm.

	I	II	III	IV	Palpus
Trochanter	0.09 mm	0.11 mm	0.17 mm	0.16 mm	0.10 mm
Femur	0.39	0.56	0.34	0.54	0.29
Patella	0.20	0.21	0.17	0.23	0.20
Tibia	0.30	0.47	0.34	0.50	0.21
Metatarsus	0.33	0.44	0.43	0.59	
Tarsus	0.29	0.50	0.30	0.33	0.21
Total	1.60 mm	2.29 mm	1.75 mm	2.35 mm	1.01 mm

Dorsum finely granulate, with parallel rows of small tubercles on dorsal areas. Posterior margins of tergites bear groups of tubercles which give them a slightly lobate appearance. Eye tubercle in the form of a pointed cone with eyes near base. Five dorsal areas present. Posterior margin of second and anterior margin of fourth coxa with small tubercles.

Fine granulations on legs terminate abruptly at calcaneus of metatarsus. Tarsal segments: 3-5-4-5. Distitarsus of 2nd pair of legs with 3 segments.

Palpus armed as in Fig. 5, Plate I.

Body concolorous yellow-orange with venter and tarsi somewhat lighter than dorsum.

Male almost identical in external appearance to female, but with blunt dorsal spur on palpal tarsus.

Holotype female, allotype male and two paratypes.—UNDER GRANITIC ROCKS 0.3 MILE NORTH JUNCTION OF WOODLAKE—LEMONCOVE ROAD ON ROAD TO BADGER, TULARE COUNTY, CALIFORNIA, 26 November 1965, T. Briggs and V. Lee. Two topotypes collected 8 April 1966, K. Hom. One specimen 0.3 mile east of Steve Barton Pt., Kaweah Reservoir, Tulare County, California, 26 November 1965, V. Lee. Holotype and allotype deposited in the collection of the California Academy of Sciences. Two paratypes deposited in the collection of the American Museum of Natural History.

Sitalcina sequoia Briggs and Hom, new species

(Figs. 3 and 4, Pl. II)

FEMALE.—Total body length, 1.04 mm. Cephalothorax, 0.35 mm. Width of body at widest portion, 0.77 mm. Width of eye tubercle, 0.17 mm. Length of eye tubercle, 0.13 mm.

	I	II	III	IV	Palpus
Trochanter	0.09 mm	0.09 mm	0.11 mm	0.11 mm	0.09 mm
Femur	0.31	0.41	0.31	0.43	0.21
Patella	0.17	0.16	0.14	0.17	0.14
Tibia	0.21	0.36	0.26	0.29	0.17
Metatarsus	0.23	0.33	0.33	0.50	
Tarsus	0.26	0.43	0.16	0.27	0.17
Total	1.27 mm	1.78 mm	1.31 mm	1.77 mm	0.78 mm

Dorsum finely granulate, with parallel rows of small tubercles on dorsal areas. Eye tubercle oval, truncate posteriorly; profile descends rapidly anteriorly; eyes present near base. Five dorsal areas apparent in lateral view. Anterior margin of cephalothorax with two teeth on each side. Posterior margin of second and anterior margin of fourth coxa with tubercles.

Fine granulations on legs terminate abruptly at calcaneus of metatarsus. Tarsal segments: 3-3-4-4. Distitarsus of 2nd leg with only 2 segments.

Palpus armed as in Fig. 4, Plate I.

Body concolorous yellow-orange with venter and tarsi somewhat lighter than dorsum.

MALE almost identical in external appearance to female.

Holotype female, allotype male and six paratypes.—UNDER LOGS 2.3 MILES SOUTH PIERCY, MENDOCINO COUNTY, CALIFORNIA, 13 March 1966, K. Hom and T. Briggs. Additional paratypes from Underwood Park, Mendocino County, California, 13 March 1966, K. Hom; 2.4 miles south Garberville, Humboldt County, California, K. Hom and T. Briggs. Holotype and allotype deposited in the collection of the California Academy of Sciences. Six paratypes deposited in the collection of the American Museum of Natural History.

Sitalcina serpentina Briggs and Hom, new species

(Figs. 1 and 2, Pl. II)

FEMALE.—Total body length, 1.37 mm. Cephalothorax, 0.43 mm. Width of body at widest portion, 1.02 mm. Width of eye tubercle, 0.19 mm. Length of eye tubercle, 0.19 mm.

	I	II	III	IV	Palpus
Trochanter	0.10 mm	0.13 mm	0.13 mm	0.16 mm	0.14 mm
Femur	0.27	0.43	0.36	0.66	0.24
Patella	0.21	0.21	0.20	0.21	0.17
Tibia	0.33	0.51	0.36	0.54	0.24
Metatarsus	0.37	0.49	0.47	0.61	
Tarsus	0.27	0.57	0.24	0.34	0.17
Total	1.55 mm	2.34 mm	1.76 mm	2.52 mm	0.96 mm

Dorsum with parallel rows of tubercles on dorsal areas, anterior margin of tergites dentate, cephalothorax with tubercular central elevation. Eye tubercle a rounded mound, irregularly tuberculate, corneal lenses present on tubercle but without eyes. Anterior margin of cephalothorax with 3 teeth on each side. Posterior margin of second and anterior margin of fourth coxa with tubercles.

Fine granulations on legs terminate abruptly at calcaneus of metatarsus. Tarsal segments: 3-4-4-5. Distitarsus of 2nd leg with 3 segments.

Palpus armed as in Fig. 4, Plate I.

Body concolorous yellow-orange with venter and tarsi somewhat lighter than dorsum.

MALE almost identical in external appearance to female, but usually of smaller size.

Holotype female, allotype male and six paratypes, UNDER SERPENTINE ON MARSHY SLOPE NEAR WEST SIDE OF SILVER CREEK ROAD, 5 MILES SOUTHEAST OF TULLY ROAD, SAN JOSE, SANTA CLARA COUNTY, CALIFORNIA, 27 February 1966, T. Briggs and C. Fox. Two paratypes beneath serpentine boulders on north slope of hill in Santa Teresa Park, Santa Clara County, California, 19 February 1966, K. Hom and A. Jung. Holotype and allotype deposited in the collection of the California Academy of Sciences. Four paratypes deposited in the collection of the American Museum of Natural History.

ECOLOGICAL NOTES

Four of these phalangodids (*Sitalcina kaweahensis*, *S. tiburona*, *S. minor*, and *S. serpentinea*) were found exclusively under moist rocks in an open hill-grassland habitat. They resembled slow-moving orange mites almost always clinging to the undersurface of the rock. The unique blind species (*S. tiburona*, *S. minor*, *S. serpentinea*) were found under serpentine rocks near permanent springs in regions of serpentine bedrock. These seemed restricted in range to a few San Francisco Bay Area localities. The phalangodids were often found in groups of two or more. A mating pair of *Sitalcina minor* was observed one mile SW of Santa Teresa Park, Santa Clara County on 27 February 1966. The number of the phalangodids found on the undersurface of rocks diminished at the end of March and was apparently nil at the end of April. A few mixed populations were discovered: *Sitalcina cockerelli* was found at each locality where *Sitalcina sequoia* was taken. They were often found together on the undersurface of logs and occasionally under rocks. *Sitalcina minor* populations were observed under the same rocks as *Sitalcina serpentinea* at the Silver Creek locality.

LITERATURE CITED

- GOODNIGHT, C. J. AND M. L. GOODNIGHT. 1942. New Phalangodidae (Phalangida) from the United States. Amer. Mus. Novitates, No. 1188, p. 1-18.
1953. The opilionid fauna of Chiapas, Mexico, and adjacent areas (Arachnoidea, Opiliones). Amer. Mus. Novitates, No. 1610, p. 1-81.